

Uinta Basin

How we understand the O&G sector universe

Operators Meeting 9/3/15

Outline

- Air Quality metrics
- Emissions data available
- Tribal Minor Source Registration data
- Data gaps

All Data: 4th Max 8-hour O3, ppb (NAAQS = 75 ppb)

Year	Dinosaur	Vernal	Redwash	Ouray	Roosevelt	Myton	Whiterocks	Fruitland	Rangely
Regulatory?	Jan'14	YES	Apr'13	Apr'13	YES	Apr'13	Apr'13	YES	YES
2007	63								
2008	66								
2009	63		67	67					
2010	68		98	117					58
2011	90		100	116		111	68	65	73
2012	75	64	67	70	67	71	69	70	69
2013	113	102	114	132	104	109	95	62	91
2014	64	62	63	79	62	67	64	64	62

Air Quality

Regulatory and Non Regulatory Design Values	Dinosaur	Vernal (Regulatory)	Redwash	Ouray	Roosevelt (Regulatory)	Myton	Whiterocks	Fruitland (Regulatory)	Rangely (Regulatory)
'11-'13	92.7		93.7	106.0		97.0	77.3	65.7	77.7
'12-'14	84.0	76.0	81.3	93.7	77.7	82.3	76.0	65.3	74.0

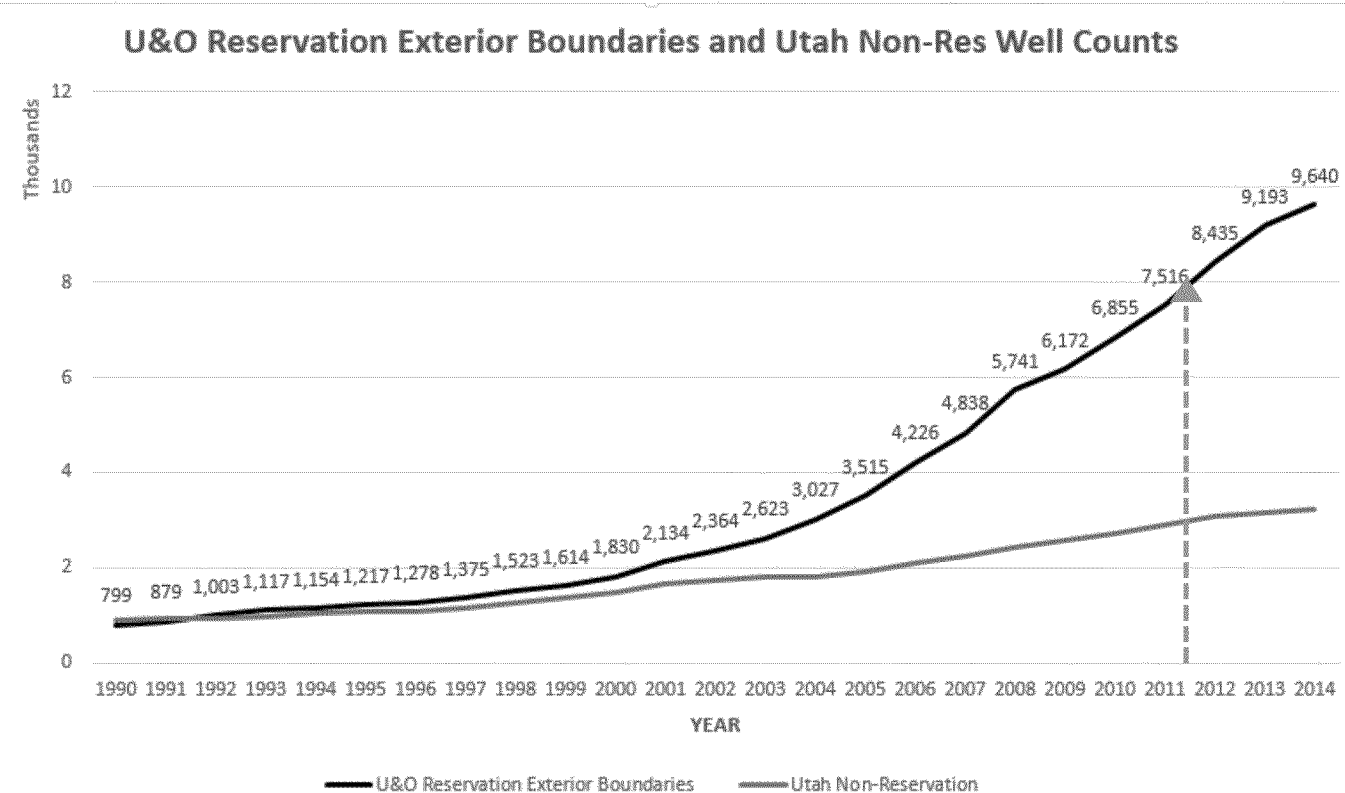
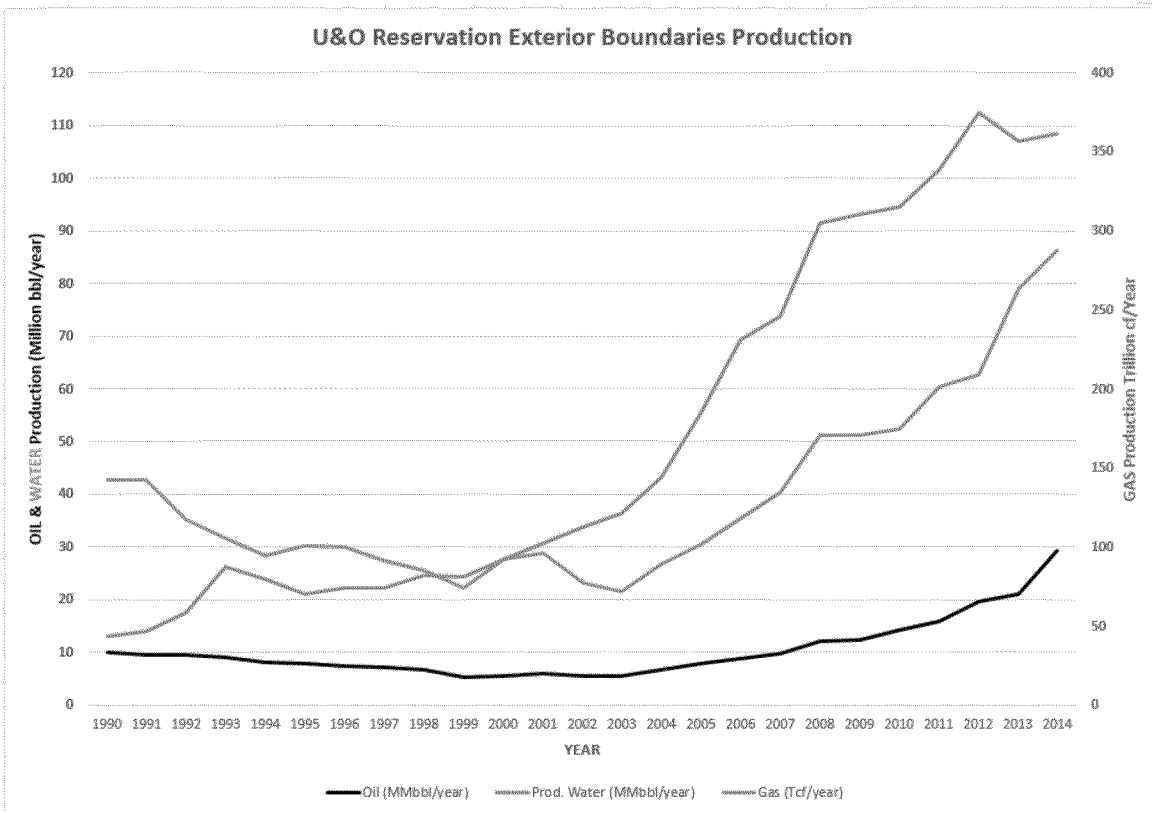
75 ppb NAAQS

Air Quality Index:

Green	Good
Yellow	Moderate
Orange	Unhealthy for Sensitive Groups
Red	Unhealthy
Purple	Very Unhealthy

Nonattainment Designation Classification	Design Value (ppb)		
	Current 75 ppb Ozone NAAQS	70 ppb Ozone NAAQS (Estimated)	65 ppb Ozone NAAQS (Estimated)
Marginal	76 - <86	71 - <80	66 - <75
Moderate	86 - <100	80 - <93	75 - <87
Serious	100 - <113	93 - <105	87 - <98
Severe	113 - <119	105 - <111	98 - <103
Extreme	119 - <175	111 - <163	103 - <152

Background



~75% of oil & gas production in Uinta Basin within exterior boundaries of Uintah & Ouray Indian Reservation

Top 20 Producers

Within the exterior boundaries of U&O		
Within Exterior Boundaries U&O Current Operator	Number of Wells (2014)	OIL Produced Barrels (2014)
NEWFIELD PRODUCTION COMPANY	1,409	7,043,408
EP ENERGY E&P COMPANY, LP	261	4,571,164
BILL BARRETT CORPORATION	284	3,151,243
CRESCENT POINT ENERGY US CORP	240	2,752,210
BERRY PETROLEUM COMPANY	578	2,171,577
ULTRA RESOURCES INC	82	1,397,871
PETROGLYPH OPERATING COMPANY INC	229	1,193,947
AXIA ENERGY LLC	43	1,106,170
QEP ENERGY COMPANY	793	1,074,473
KERR-MCGEE CORP.	2,706	1,042,197
LINN OPERATING, LLC	374	984,680
EL PASO CORPORATION	68	856,407
EOG RESOURCES, INC.	1,319	655,458
FINLEY RESOURCES, INC.	85	559,420
DEVON ENERGY CORPORATION	9	204,067
QUINEX ENERGY CORP	17	180,084
CITATION OIL AND GAS CORPORATION	43	125,897
XTO ENERGY, INC.	416	97,486
GASCO PRODUCTION COMPANY	123	74,545
HARVEST (US) HOLDINGS, INC	8	50,859
SUM TOP 20	9,087	29,293,163
Compared to TOTAL 2014 U&O:	9,640	29,499,562
Top 20 account for	94%	99%
43 Operators account for remainder		

Within exterior boundaries of U&O		
Within Exterior Boundaries U&O Current Operator	Number of Wells (2014)	GAS Produced MMcf (2014)
KERR-MCGEE CORP.	2,706	203,382,460
EOG RESOURCES, INC.	1,319	35,547,477
QEP ENERGY COMPANY	793	24,401,675
BERRY PETROLEUM COMPANY	578	15,826,652
NEWFIELD PRODUCTION COMPANY	1,409	11,888,643
BILL BARRETT CORPORATION	284	11,389,526
XTO ENERGY, INC.	416	10,740,094
EP ENERGY E&P COMPANY, LP	261	8,395,942
GASCO PRODUCTION COMPANY	123	6,759,713
LINN OPERATING, LLC	374	5,740,810
WHITING OIL AND GAS CORPORATION	22	3,664,200
DOMINION EXPLORATION & PROD INC	152	3,402,929
CRESCENT POINT ENERGY US CORP	240	2,854,439
EL PASO CORPORATION	68	2,486,421
PETROGLYPH OPERATING COMPANY INC	229	2,163,362
ULTRA RESOURCES INC	82	1,450,111
AXIA ENERGY LLC	43	1,406,147
ENDURING RESOURCES, LLC	74	1,213,888
WEXPRO COMPANY	64	1,081,372
MILLER, DYER & CO. LLC	4	879,279
SUM TOP 20	9,241	354,675,140
Compared to TOTAL 2014 U&O:	9,640	361,612,254
Top 20 account for	96%	98%
43 Operators account for remainder		

Add travis map showing wells by operator

WRAP – Phase III Emission Inventory

UINTA BASIN - WRAP PH.III										
Description	2006 Emissions (tons/year)					2012 Emissions (tons/year)				
	NOx	VOC	CO	SOx	PM10	NOx	VOC	CO	SOx	PM10
Dehydrator	148	19,470	124	0	11	225	30,665	189	0	17
Pneumatic devices	0	14,916	0	0	0	0	25,083	0	0	0
Oil Tank	0	14,357	0	0	0	0	20,722	0	0	0
Pneumatic pumps	0	8,386	0	0	0	0	14,322	0	0	0
Condensate tank	0	6,195	0	0	0	0	21,719	0	0	0
Unpermitted Fugitives	0	1,910	0	0	0	0	3,212	0	0	0
Permitted Sources	2,339	1,320	927	5	32	3,184	4,355	2,517	8	48
Truck Loading of Oil	0	964	0	0	0	0	1,391	0	0	0
Venting - Compressor Startup	0	825	0	0	0	0	1,300	0	0	0
Venting - Compressor Shutdown	0	782	0	0	0	0	1,233	0	0	0
Artificial Lift	2,184	674	2,522	1	94	3,053	955	34,750	2	136
Compressor engines	2,207	510	2,318	0	31	3,169	695	4,236	0	46
Drill rigs	4,779	415	1,804	362	354	4,773	362	1,507	3	236
Venting - blowdowns	0	292	0	0	0	0	460	0	0	0
Venting - initial completions	0	241	0	0	0	0	332	0	0	0
Truck Loading of Condensate	0	127	0	0	0	0	445	0	0	0
Heaters	1,016	58	863	7	80	1,671	95	1,420	11	132
Miscellaneous engines	163	39	59	0	1	199	63	201	0	1
Venting - recompletions	0	37	0	0	0	0	51	0	0	0
Workover rigs	255	24	103	21	21	271	22	91	0	15
Gas Plant Truck Loading	0	3	0	0	0	0	12	0	0	0
Condensate tank flaring	1	0	3	0	0	2	0	9	0	0
Dehydrator Flaring	0	0	1	0	0	0	0	1	0	0
Initial completion Flaring	1	0	3	0	0	1	0	4	0	0
Total	13,093	71,546	8,727	396	623	16,547	127,495	44,925	24	631

Western Regional Air Partnership (WRAP) defines the Uinta Basin as wholly including the counties of Carbon, Duchesne, Emery, Grand, Uintah and Wasatch

GHGRP-W – 2013 Data

Summary data collected by the Greenhouse Gas Reporting Program for 2013
This data was reported to EPA by facilities as of 8/18/2014.
All emissions data is presented in units of metric tons of carbon dioxide equivalent using GWP's from IPCC's AR4 (see FAQs tab)

Facility Id	FRS Id	Facility Name	Basin	Total reported emissions from Onshore Oil & Gas Production	Total Emissions from Onshore Oil & Gas Production by Gas		
					CO2 emissions (non-biogenic)	Methane (CH4) emissions	Nitrous Oxide (N2O) emissions
1009282	110002994190	575 Uinta Basin QEP Energy Company	575 - Uinta Basin	418,397	29,157	389,205	35
1008167	110055512529	Berry Petroleum Company - Uinta Basin 575	575 - Uinta Basin	111,371	15,647	95,699	24
1009357	110028136700	Bill Barrett Corporation - Uinta Basin (575)	575 - Uinta Basin	212,379	66,835	145,436	108
1007481	110015761996	ConocoPhillips' Uinta (575)	575 - Uinta Basin	76,965	536	76,429	
1008086	110002004964	Crescent Point Energy U.S. Corp - Uinta Basin (575 - Uinta Basin	32,222	6,037	26,170	15
1008354	110034207481	EOG Resources, Inc. 575 Uinta basin	575 - Uinta Basin	562,551	1,513	561,038	1
1009350	110054613539	EP Energy E&P 575 Uinta basin	575 - Uinta Basin	132,740	5,533	127,204	4
1008109	110055512271	Gasco Energy Uintah Basin Operations	575 - Uinta Basin	55,180	611	54,569	1
1008407	110055512388	Newfield,575.Uinta	575 - Uinta Basin	106,375	54,682	51,617	77
1009165	110028136700	Uinta Basin - AAPG Province 575	575 - Uinta Basin	440,990	60,028	380,955	7
1008169	110032607089	Uinta Basin Wexpro Company	575 - Uinta Basin	18,550	11	18,539	
1011221	110014428770	Ultra Resources/Uintah Basin	575 - Uinta Basin	43,960	37,665	6,277	18
1009389	110055516035	XTO Energy Inc 575 Uintah	575 - Uinta Basin	174,221	13,688	160,492	42

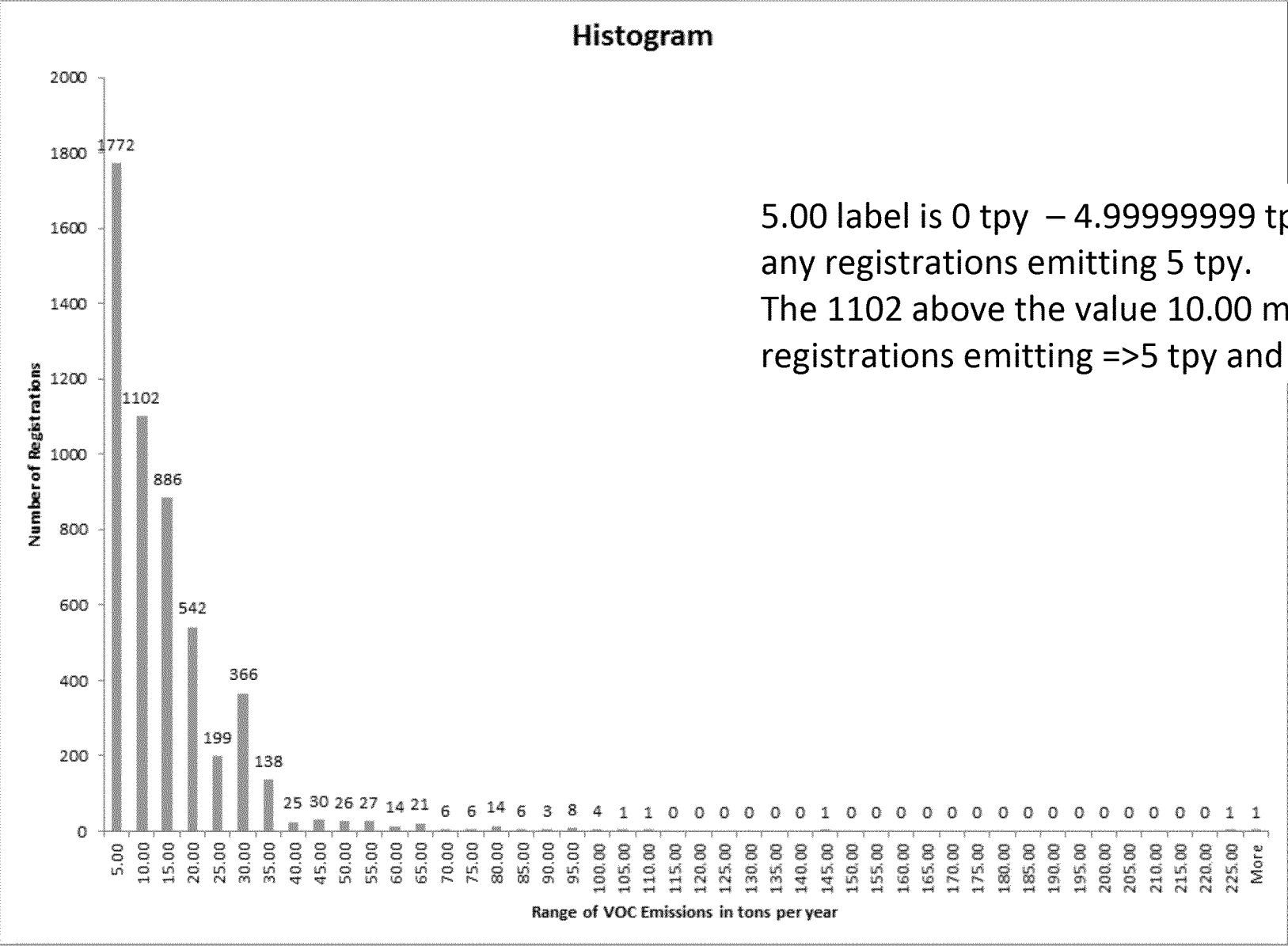
EPA's Greenhouse Gas Reporting Program - Subpart W covers the Petroleum and Natural Gas Systems. Defines Uinta Basin as the counties of Carbon, Daggett, Duchesne, Uintah and Wasatch.

Tribal Minor Source Registrations

REGISTRATIONS	
Operator (28) - June 2015	# Facilities
Kerr-McGee Oil and Gas Onshore LP	1,969
EOG Resources, Inc.	1,274
XTO Energy, Inc	827
QEP Energy Company	684
Newfield Production Company	267
Crescent Point Energy U.S. Corp	69
Ultra Resources, Inc.	64
Bill Barrett Corporation	61
Berry Petroleum Company	44
El Paso Midstream Group, Inc	37
Whiting Petroleum Company	36
EP Energy E&P Company, L.P.	35
Koch Exploration Company	32
Anadarko Uintah Midstream, LLC	18
Rosewood Resources, Inc.	9
Enduring Resources, LLC	6
Gasco Energy, Inc	6
QEP Field Services Company	5
Ute Energy, LLC	4
Red Rock Gathering Company, LLC	3
Monarch Natural Gas, LLC	2
American Gilsonite Company	1
Axia Energy, LLC	1
Mid-America Pipeline Company, LLC	1
Red Leaf Resources, Inc.	1
Rhine Construction	1
US Oil Sands (Utah) Inc.	1
Axia Energy II, LLC	1
TOTAL	5,459

Operator	# Registrations	PM10	PM2.5	SO2	NOx	CO	VOC
EOG Resources, Inc.	1272				254	215	18,622
XTO Energy, Inc	568	53	53	90	4,851	4,313	17,607
Kerr-McGee Oil and Gas Onshore LP	1966			3	1,878	1,615	13,800
QEP Energy Company	684	22	22	2	944	808	5,095
Newfield Production Company	252	41	41	1	858	1,072	3,085
Berry Petroleum Company	367	38	38	1	1,264	1,359	1,983
Bill Barrett Corporation	54	15	14	39	258	236	942
Ultra Resources, Inc.	55	23	23	4	315	639	806
Koch Exploration Company	31	1	1	-	7	6	564
Anadarko Uintah Midstream, LLC	18	1	1	0	916	121	458
Crescent Point Energy U.S. Corp	63	12	6	0	163	246	452
EP Energy E&P Company, L.P.	32	5	5	0	130	122	397
Whiting Petroleum Company	36	1	1	0	10	8	237
El Paso Midstream Group, Inc	37						132
QEP Field Services Company	5	4	4	1	127	96	82
Rosewood Resources, Inc.	9	1	1	0	49	16	59
US Oil Sands (Utah) Inc.	1	3	1	13	71	55	42
Enduring Resources, LLC	6	0	0	0	5	4	42
Red Rock Gathering Company, LLC	3	1	1	0	89	50	40
Ute Energy, LLC	4	1	1	-	7	8	37
Gasco Energy, Inc	4	0	0		7	17	23
Axia Energy, LLC	2	0	0	0	5	9	15
Monarch Natural Gas, LLC	2	0	0	0	34	20	14
Linn Energy, LLC	1	0	0	0	4	3	9
American Gilsonite Company	1	20	20	0	3	5	9
Mid-America Pipeline Company, LLC	1	1	1	1	70	94	5
Red Leaf Resources, Inc.	1	9	2	1	21	7	3
Rhine Construction	1	4	2				
							9
Total registrations as of 12/23/2014	5476	257	238	157	12,340	11,144	64,561

Tribal Minor Source Registrations, cont'd



5.00 label is 0 tpy – 4.99999999 tpy and does not include any registrations emitting 5 tpy.
The 1102 above the value 10.00 means there are 1102 registrations emitting =>5 tpy and <10 tpy

Tank Data (E&P Tanks & GOR)

Weighted Average VOC lb/bbl =

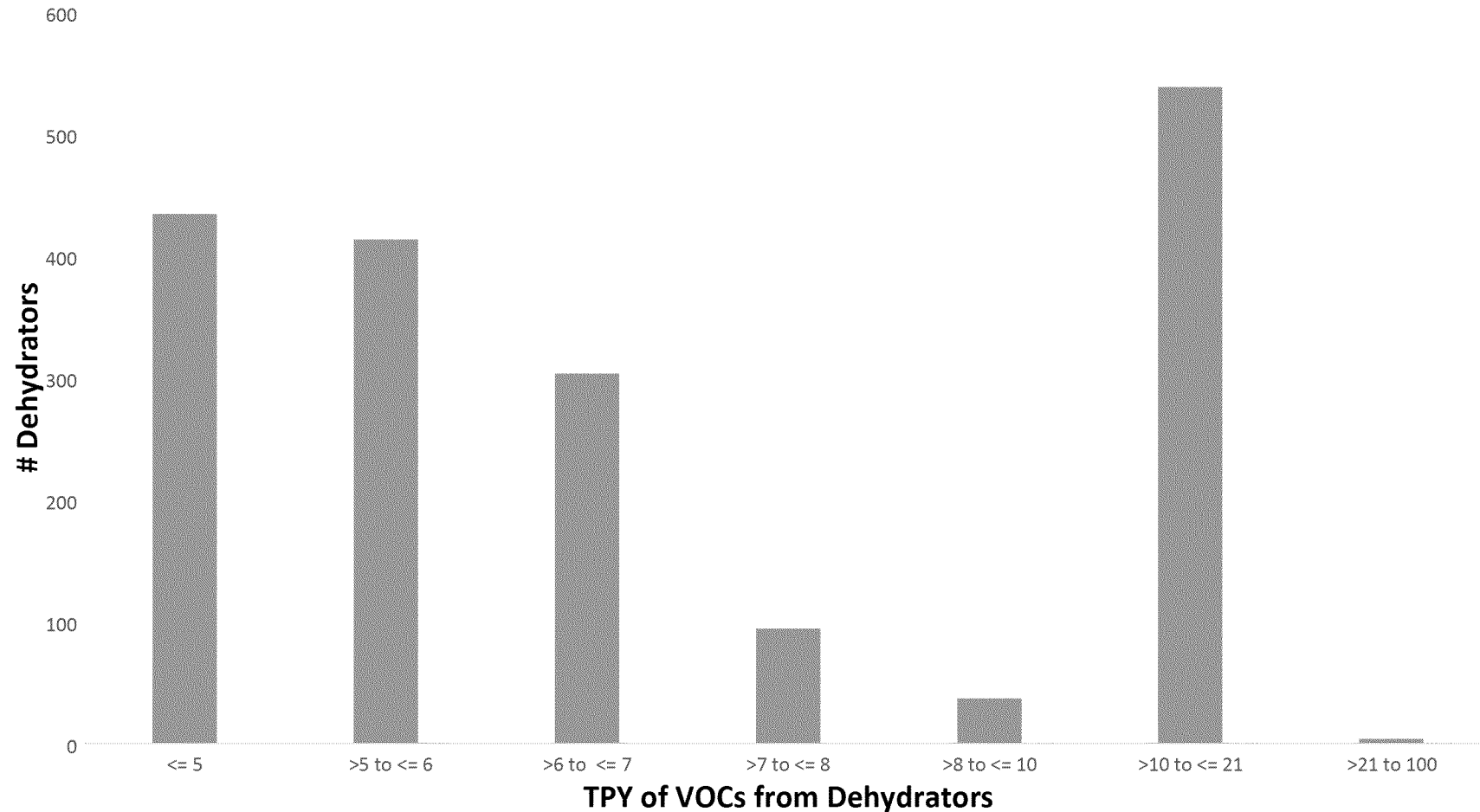
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Operator	# of Registrations	Separator T (°F)	Separator P (psig)	VOC lb/bbl AVG	VOC lb/bbl Std. Deviation
A	37	82	57	6.5	0.0
B	34	160	30-38	1.0	0.2
C	1966	74-75	108-138	5.9	1.8
D	32	60-99	200-380	1.1	0.0
F	59	100-168	30-85	1.3	0.5
G	1	70	64	0.6	0.0
H	734	40-157	17-330	46.0	24.6
H	6	50-72	110-135	8.8	15.0
I	8	50-157	80-600	5.4	5.3
J	35	100-108	52-700	4.2	6.2
K	566	40-80	25-190	0.3	0.1
L	1274	45-90	200-325	7.2	1.7
M	83	158	40	1.1	0.0
O	86	64-163	60-70	0.4	0.0
P	9	80	65	4.6	3.9
Q	261	N/A	N/A	1.0	1.7
R	6	48	90	8.2	0.0
S	18	N/A	N/A	2.2	0.0

Distribution of Wells Prod relating to TPY VOCs

Glycol Dehydrators on U&O Reservation

VOC Emissions from Glycol Dehydrators - U&O Reservation
(Source: Tribal Minor Source Registrations)



Speciation Profiles for Tanks

Speciation Profiles for Dehys

Data Gaps – Research shows ...

- Discrepancy between top-down measurements and bottom-up emission inventories
 - In UB, airborne measurements ~8.9% of gas produced to atmosphere compared to GHGRP-W ~ 1.0%
 - In UB, Ozone modeling shows low negative bias for VOCs and methane by factor of 1.8 and 4.8 respectively

Data Gaps – Research shows ...

- Skewed emission distributions, fat tail, “super-emitter” ... a small number of sources account for a large % of emissions – **not fixed in time or space**
 - Wellpads – 86 natural gas wellsites ... ~5% sites → ~60% of emissions
 - Midstream Compressor Stations - 114 CSs ... 30% sites → ~80% of emissions
 - Gas Plants - 16 gas processing plants ... 45% sites → ~80% of emissions
 - Transmission Compressor Stations – 45 CSs ... 10% sites → ~ 50% of emissions
 - Abandoned Wells – 19 abandoned wells... 3 of the 19 wells had CH₄ flow rates three orders of magnitude larger than the median flow rate
 - Well Liquid Unloading – 107 wells with liquid unloadings ...
 - w/o plunger lift: 20% wells → 83% of emissions
 - w/ plunger lift and manual: 20% wells → 65% of emissions
 - w/ plunger lift and automatic: 20% wells → 72% of emissions
 - Pneumatic Controllers – 377 controllers ... 20% devices → 96% of emissions